

NATURAL RADIOACTIVITY ASSESSMENT BY GAMMA SPECTROMETRY IN SOME COMMERCIALY-USED GRANITES FROM PARANÁ STATE, BRAZIL: PRELIMINARY RESULTS

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Naturally occurring radionuclides with half-lives of the same order that the age of the earth, like ^{40}K and the radionuclides from the ^{238}U and ^{232}Th series, represent the main external source of background radiation exposure of the population. The activity concentrations of those terrestrial radionuclides are strongly dependant on geological and geographical conditions, high radiation levels being associated with igneous rocks, such as granite. Granite is a building material frequently used as ornamental rocks or coating tiles in kitchens, bathrooms and even in sitting rooms and bedrooms. The knowledge of the granites activities concentrations is very important to assess any potential radiological hazard to mankind due to granite as an ornamental building material. In Paraná state, Brazil, the geology presents sedimentary, magmatic and igneous rocks, and 87% of granites used as decorative building materials are mostly from the crystalline basement, with rocks originated in the Proterozoic era, aged between 2.5 billion and 550 million years, due to mainly acid magmatism. The aim of this work is to establish a database for commercially-used granites from Paraná state and to estimate the potencial radiological hazard by assessing the radium equivalent activity and the external and internal hazard indexes. The ^{226}Ra , ^{232}Th and ^{40}K activities concentrations were measured by high-resolution gamma-ray spectrometry with a coaxial high-purity germanium detector (HPGe) of 15% relative efficiency with conventional electronics and an a 919 ORTEC EG&G Spectrum Master 4k multichannel analyzer. All spectra were analyzed with the InterWinner 6.0 software. In a first run, eleven different commercial granites samples were collected directly from hardware stores. All samples were pulverized and sealed in standard 100-mL HDPE flat-bottom cylindrical flask with screw cap and bubble spigot. The samples were measured in triplicate, after a 4 weeks ingrowth period for radioactive equilibrium in the ^{238}U and ^{232}Th series. Preliminary results without considering samples self-attenuation show activities concentrations varying from $4 \pm 1 \text{ Bq kg}^{-1}$ to $79 \pm 3 \text{ Bq kg}^{-1}$ for ^{226}Ra , $7 \pm 1 \text{ Bq kg}^{-1}$ to $142 \pm 6 \text{ Bq kg}^{-1}$ for ^{232}Th and $214 \pm 14 \text{ Bq kg}^{-1}$ to $1200 \pm 58 \text{ Bq kg}^{-1}$ for ^{40}K . All results are within the range of literature values for similar rocks. The complete assessment will be achieved by April 2011.